e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(7); 1124-1126

Original Research Article

Role of Serum Uric Acid in Predicting the Severity of Preeclampsia and Associated Perinatal Outcome

Mahesh Reddy[1], Pramod R. Kulkarni[2], Preetam[3]

[1]Assistant Professor, Department of General Medicine, Bidar Institute of Medical Sciences (BRIMS), Bidar, Karnataka, India

[2]Assistant Professor, Department of Obstetrics and Gynaecology (OBG), Bidar Institute of Medical Sciences (BRIMS), Bidar, Karnataka, India

[3]Assistant Professor, Department of Psychiatry, Yadgiri Institute of Medical Sciences (YIMS), Yadgiri, Karnataka, India

Received: 01-04-2026 / Revised: 15-05-2026 / Accepted: 21-06-2026

Corresponding author: Dr. Pramod R. Kulkarni

Conflict of interest: Nil

Abstract

Background and Objectives: Pre-eclampsia complicates 5–7% of pregnancies worldwide and remains a major cause of maternal and perinatal morbidity and mortality. Serum uric acid (UA) elevation is one of the earliest detectable laboratory alterations in pre-eclampsia. This study aims to evaluate and compare serum UA levels in normotensive and pre-eclamptic pregnant women, assessing its utility as a biomarker for early detection of severity and its correlation with perinatal outcomes.

Methodology: A prospective comparative hospital-based study was conducted involving 200 pregnant women (≥20 weeks of gestation, aged 18–35 years), divided equally into 100 pre-eclamptic cases and 100 normotensive controls. Serum UA levels were measured using the automated uricase-peroxidase method. Maternal and perinatal outcomes were tracked until the 7th postpartum day.

Results: The mean serum UA level was significantly higher in the pre-eclamptic group (5.78 ± 1.1 mg/dL) compared to the control group (4.1 ± 0.6 mg/dL, p = 0.001). Elevated UA levels (>5 mg/dL) were found in 54% of pre-eclamptic mothers compared to only 20% of normotensive controls. Higher serum UA significantly correlated with severe maternal complications (6.86 ± 1.43 mg/dL vs. 4.61 ± 1.00 mg/dL, p = 0.005) and adverse fetal outcomes, particularly intrauterine fetal demise (7.4 ± 2.04 mg/dL).

Conclusion: Elevated serum uric acid is a reliable and inexpensive predictor of pre-eclampsia severity, maternal complications, and poor perinatal outcomes. Weekly or thrice-weekly monitoring provides critical prognostic insights for optimal clinical intervention.

Keywords: Uric acid, Pre-eclampsia, Perinatal outcome, Hyperuricemia.

DOI: 10.25258/ijcpr.18.7.171

Introduction

Hypertensive disorders of pregnancy (HDP) represent a major global health challenge, ranking second only to anemia in developing nations as a primary cause of detrimental maternal and fetal effects.

Pre-eclampsia (PE), a multi-system disorder of unknown etiology, affects approximately 5–7% of pregnancies worldwide, with incidence rates reaching 11–13% in India as reported by the Federation of Obstetrics and Gynaecological Societies of India (FOGSI).

PE is clinically characterized by the new onset of hypertension (≥140/90 mmHg) and proteinuria after 20 weeks of gestation. Pathologically, it is conceptualized as a two-stage disorder: Stage 1 involves defective endovascular trophoblastic remodeling of the maternal spiral arterioles, leading to placental ischemia; Stage 2 is characterized by the systemic release of anti-angiogenic factors (such as sFlt-1 and soluble endoglin), causing widespread maternal endothelial dysfunction, vasospasm, and multi-organ impairment.

Hyperuricemia is a prominent laboratory hallmark of PE. While serum UA levels typically decrease during early pregnancy due to estrogen-induced uricosuria and expanded plasma volume, they rise significantly in PE.

This rise is primarily driven by reduced renal clearance, increased tubular reabsorption due to a lower glomerular filtration rate (GFR), and

accelerated tissue breakdown from placental ischemia. Consequently, serum UA has emerged as an accessible biomarker to gauge the severity of pre-eclampsia and predict adverse perinatal outcomes.

Materials and Methods

This prospective comparative study was conducted at the Department of Obstetrics and Gynaecology, BRIMS, Bidar from January 2024 to March 2025. A total of 200 pregnant women aged 18–35 years with a gestational age of ≥20 weeks were enrolled and categorized into two groups:

Study Group (Cases): 100 pregnant women diagnosed with pre-eclampsia based on NHBPEP criteria (≥140/90 mmHg on two occasions at least 4 hours apart with concurrent proteinuria ≥1+ on dipstick).

Control Group: 100 age- and gestational-age-matched healthy normotensive pregnant women.

Exclusion criteria included multiple gestations, pre-existing chronic hypertension, renal disease, diabetes mellitus, heart disease, gestational trophoblastic disease, or active urinary tract infections (UTI).

Biochemical Estimation: Maternal venous blood (3 mL) was collected, allowed to clot, and centrifuged at 4000 rpm for 10 minutes. Serum uric acid was quantified using a fully automated analyzer via the Uricase-Peroxidase method. Uricase converts uric acid to allantoin and hydrogen peroxide (H2O2), which undergoes a quinone indicator reaction measured photometrically at 520 nm.

Statistical Analysis: Data were compiled and analyzed using SPSS version 15.0 and MedCalc. Continuous variables are expressed as Mean ± SD and evaluated using the independent Student's t-test or ANOVA. Categorical parameters are presented as numbers and percentages and analyzed using the Chi-square or Fisher's exact test. A p-value < 0.05 was considered statistically significant.

Results

The demographic distribution demonstrated strict parity and matching between the two cohorts. Half of the subjects (50%) fell within the 18–22 age bracket, and 58% had a gestational age >36 weeks. Primigravidae constituted 52% of the pre-eclamptic group compared to 44% of the control group.

Table 1: Comparison of Blood Pressure Parameters

Parameter	Cases (n=100)	Controls (n=100)	p-value
SBP (mmHg)	151.20 ± 13.7	118.90 ± 7.5	0.001
DBP (mmHg)	102.80 ± 9.2	74.80 ± 5.4	0.001

As shown in Table 1, both systolic and diastolic blood pressures were significantly elevated in the case cohort (p = 0.001).

Table 2: Distribution of Serum Uric Acid Levels

Serum UA	Cases (n=100)	Controls (n=100)	p-value
< 5 mg/dL	46 (46%)	80 (80%)	0.001
≥ 5 mg/dL	54 (54%)	20 (20%)	—

Hyperuricemia (≥5 mg/dL) was present in 54% of pre-eclamptic mothers, contrasted against only 20% of the normotensive controls (p = 0.001, Table 2).

The overall mean serum UA was significantly higher in cases (5.78 ± 1.1 mg/dL) than controls (4.1 ± 0.6 mg/dL, p = 0.001).

Maternal and Perinatal Complications: Maternal complications (placental abruption and HELLP syndrome) occurred exclusively within the case group (14% vs. 0%, p = 0.006). The mean serum UA level was significantly higher in pre-eclamptic women who suffered these complications (6.86 ± 1.43 mg/dL) compared to those who did not (4.61 ± 1.00 mg/dL, p = 0.005).

Furthermore, the operational rate of Lower Segment Cesarean Section (LSCS) was higher in the pre-eclamptic cohort (50% vs. 44%), primarily driven by fetal distress (48%) and oligohydramnios (24%).

Table 3: Serum Uric Acid Levels and Fetal Outcomes in Cases

Outcome	N	Mean UA (mg/dL)	Std. Deviation
Preterm	26	5.75	0.92
Term	58	5.68	1.02
IUD	6	7.40	2.04
IUGR	10	5.44	1.44

Fetal outcomes varied dramatically: Intrauterine Fetal Demise (IUD) was noted in 6% of cases and 0% of controls. Notably, mothers whose pregnancies ended in IUD demonstrated the highest

mean serum UA levels (7.40 ± 2.04 mg/dL, Table 3). Low birth weight (<2.5 kg) occurred in 39% of cases versus 10% of controls ($p = 0.00011$). Neonatal Intensive Care Unit (NICU) admissions were required for 11% of infants born to pre-eclamptic mothers compared to only 1% of controls ($p = 0.029$). Lower APGAR scores (<7) at the 1st and 5th minutes were also significantly associated with the pre-eclamptic group ($p < 0.05$).

Discussion

Our findings confirm that hyperuricemia closely tracks the clinicopathological progression of pre-eclampsia. The mean serum UA level in our case cohort (5.78 ± 1.1 mg/dL) aligned significantly with historical series by Sreelatha et al. (6.0 ± 1.43 mg/dL), D'Anna et al. (6.25 ± 1.23 mg/dL), and Apeksha et al. (5.46 ± 1.51 mg/dL). The positive correlation between elevated serum UA levels, elevated maternal blood pressures, and the emergence of severe systemic complications (abruption, HELLP syndrome) confirms that uric acid serves as an accurate index of severe endothelial injury and localized tissue hypoperfusion.

On the perinatal side, the strong association between maternal hyperuricemia and complications like low birth weight, preterm birth, and IUD reflects the degree of placental hypoxia and cellular damage.

Uric acid has been shown to inhibit vascular endothelial growth factor (VEGF)-induced endothelial cell proliferation, directly impairing fetal angiogenesis and trophoblastic invasion, which translates clinically into fetal growth restriction and distress.

Conclusion

Serum uric acid stands out as a reliable, cost-effective, and easily quantifiable marker to predict the severity and complications of pre-eclampsia. Serial monitoring—once weekly for gestational hypertension and up to thrice weekly for severe pre-eclampsia—enables clinicians to identify high-risk patients early, optimize surveillance, and execute timely delivery to prevent maternal and perinatal morbidity and mortality.

References

1. Zamorski MA, Green LA. NHBPEP Report on High Blood Pressure in Pregnancy. Am Fam Physician. 2001;64(2):263-271.
2. Cunningham FG, Leveno KJ, Bloom SL, et al. Williams Obstetrics. 24th ed. McGraw-Hill; 2014.
3. Powers RW, Bodnar LM, Ness RB, et al. Uric acid concentrations in early pregnancy among preeclamptic women. Am J Obstet Gynecol. 2006;194:160.
4. Roberts JM, Bodnar LM, Lain KY, et al. Uric acid is as important as proteinuria in identifying fetal risk. Hypertension. 2005;46:1263-1269.
5. Sreelatha S, et al. Study of serum uric acid and its correlation in preeclampsia. Int J Adv Case Rep. 2015;2(7):447-449.
6. D'Anna R, Baviera G, Scilipoti A, et al. Serum uric acid as a marker of pre-eclampsia. Panminerva Med. 2000;42(2):101-103.
7. Niraula A, Lamsal M, Majhi S, et al. Significance of Serum Uric Acid in Pregnancy Induced Hypertension. J Natl Med Assoc. 2017;109(3):198-202.